



Missouri's Aquatic Ecosystems

Questions to consider

- 1 What is an ecosystem? What are some of the parts of an ecosystem?
- 2 How do the parts of an ecosystem interact with one another?
- 3 What are Missouri's aquatic regions? How do the characteristics of the land affect the nature of the water?
- 4 What kinds of aquatic ecosystems do we have in Missouri? How are they alike or different from one another?
- 5 What is biodiversity? Why is it important?
- 6 How do humans impact aquatic ecosystems?
- 7 How can we help conserve aquatic ecosystems?

An **ecosystem** is a complex web of relationships between living and non-living things. The biotic parts of the ecosystem are the communities of plant and animal populations, including humans. The abiotic parts include sunlight, air, water, temperatures, soil and minerals. Each part of an ecosystem is connected to and depends on all the others. It takes all the parts interacting to make the system work. As Sierra Club founder John Muir said, "When one tugs at a single thing in nature, he finds it attached to the rest of the world." All populations living together within a community interact with one another and with their environment to survive and maintain a balanced ecosystem. Conversely, a healthy, balanced ecosystem provides for all the needs of the communities that live in it. Ecosystems organized around bodies of water are called **aquatic ecosystems**. The study of ecosystems is known as ecology.

The characteristics of the land in each of Missouri's five physiographic regions affect the nature of Missouri's waters and watersheds. Missouri has four different aquatic regions. The four regions are the Ozarks, Prairie, Lowland and Big River. Just as different watersheds create different water bodies, different aquatic regions support different kinds of life. (FIG. 6.1)

Three kinds of aquatic ecosystems

Missouri has three kinds of aquatic ecosystems: streams, lakes and wetlands. (FIG. 6.2) **Rivers** and **streams** contain flowing water. Rivers are just large streams. **Lakes** and **ponds** contain standing water. Lakes are larger than ponds. **Wetlands** are covered with shallow water at least part of the year. Missouri has two main kinds of wetlands—**marshes** and **swamps**. Marshes have cattails or other grass-like plants. Swamps have trees or woody shrubs. Other aquatic ecosystems not found in Missouri are oceans and estuaries, the places where rivers and oceans meet.

Streams

A stream is a body of water with a measurable **current**. The current flows between two stream banks and over an underwater streambed. Scientists use the word "stream" to describe all flowing natural waters. Streams are ever-changing systems that move, store and transform water. They also move, store and transform sediment and organic matter. Streams are constantly moving and changing. As someone has said, "You can't step into the same river twice."

Missouri has lots of different kinds of streams that vary from one corner of the state to the other. They have different sizes, shapes, lengths, flow rates, plants, animals, water quality and streambed composition. Regardless of their size, shape or location, however, all healthy Missouri streams share a common feature. They are diverse ecosystems. The plants and animals living in them exist in balance with the processes that recycle nutrients within an ecosystem. The healthiest streams are those that are closest to their natural state.

Lakes and ponds

Lakes and ponds are among Missouri's most well-known aquatic ecosystems. You may be surprised to learn, however, that Missouri actually has very few natural lakes or ponds. Those we have were formed from bends in rivers or streams that got cut off from the main channel. These are called **oxbow lakes**.

Missouri's aquatic regions (FIG. 6.1)

Missouri has four different aquatic regions: the Ozarks, Prairie, Lowland and Big River.



Big River

The Big Muddy gets its nickname from the high sediment load it picks up from its prairie watershed. The Missouri River once occupied a wide, braided channel with many islands, backwaters, sloughs, oxbow lakes and floodplain wetlands. In the 20th century, engineers straightened and restricted the Missouri into a single narrow channel with a swift current to make it easier for barges to navigate. While it still looks muddy to us today, it is in fact much clearer than it was in its natural condition. Like the Missouri, the Mississippi south of the meeting of the rivers has been straightened to enable barges to use it. Upstream from St. Louis, dams divide the Mississippi into a series of lake-like "pools." These pools flooded the shallow rapids that made navigation difficult. Big rivers harbor big fish. Blue catfish, flathead catfish, buffalo, drum, paddlefish and three species of sturgeon make the big rivers their home.

Prairie

The Osage Plains and the Dissected Till Plains of northern Missouri have similar aquatic communities. Prairie streams flow through broad, flat valleys that slope gradually through deep soil and other loose material. Originally these streams wound back and forth extensively, leaving oxbow lakes, sloughs and marshes. Most have now been straightened to accommodate intensive agriculture. The fish species in this region are less varied than in other regions, and aquatic plants are sparse.

Ozarks

Ozark streams run in narrow, steep-sided valleys bordered by sheer limestone/dolomite bluffs. The streams themselves are a series of short pools and well-defined riffles. Chert gravel and cobble and limestone/dolomite boulders and bedrock form the streambeds. Many springs feed these streams, while in other places streams lose water to the ground below. The abundance of springs keeps these streams cool year-round, allowing them to support smallmouth bass and even transplanted trout. Over a third of Missouri's fish species occur in the Ozarks, and more than a dozen species occur nowhere else in the world.

Lowland

Before Europeans and their descendants settled in Missouri, a cypress-tupelo swamp covered the southeastern lowlands. Floodwaters of the Mississippi River frequently swept as far west as the St. Francis River. In the early 1900s, developers cut the forests and dug 1,200 miles of drainage ditches. Today the lowlands support intensive agriculture. Draining the swamp greatly altered lowland aquatic animal communities, reducing species that favored still water and increasing those characteristic of flowing water.

(FIG. 6.3) Missouri also has natural sinkhole ponds, formed by collapsing cave systems. Most other lakes and ponds in Missouri are artificial. Large lakes are formed by damming rivers or streams. Small ponds are formed by trapping water in valleys or other low spots in a watershed. These range from small farm ponds of less than an acre to large reservoirs such as the Lake of the Ozarks.

A pond is a body of standing (not flowing) water. It is shallow enough that sunshine can reach the bottom, allowing rooted plants to grow completely across it. Its water temperature is fairly even throughout the pond and changes with air temperature. There is little wave action, and the bottom is usually covered with mud. Lakes are bigger than ponds. While lakes and ponds have much in common, a lake's larger size makes for some differences, including differences in oxygen levels, plant growth and temperature. Like ponds, lakes also benefit from plant **buffers** and other conservation methods to keep their waters clean and clear.

Swamps and marshes

Wetlands are the most productive ecosystems in the world. No other type of ecosystem has more value to countless species of wildlife. Wetlands provide many benefits to humans and the environment, and they offer endless hours of outdoor fun. Yet wetlands have a bad reputation. To some people, the word "wetland" means a stinky, bug-infested wasteland. Others think wetlands should be drained and put to "better" use. The truth is, healthy wetlands are very important to us.

Most of our country's wetlands have been destroyed over the last 70 years. Over half of them have been lost as a result of drainage and filling. Many of the wetlands that are left suffer from sedimentation, pollution and changes people have made. Of the 2.4 million acres of swamp that once stood in southeast

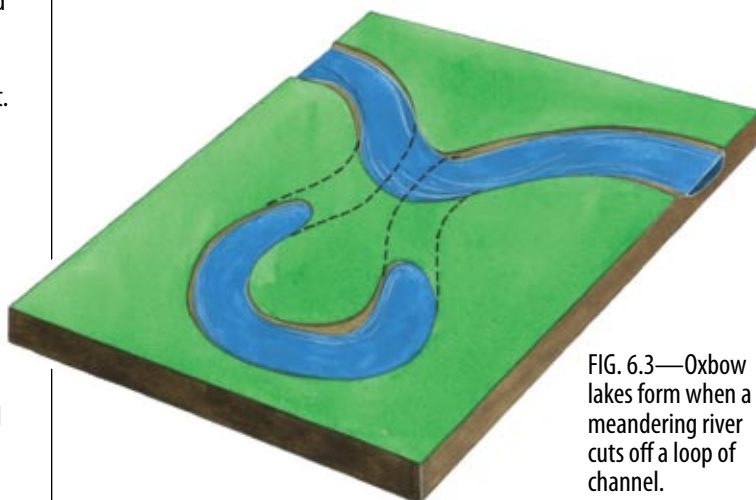


FIG. 6.3—Oxbow lakes form when a meandering river cuts off a loop of channel.



CLIFF WHITE

Lake



MDC FILE

Pond



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Stream



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River

Streams

Rivers are just large streams.

Lakes

Lakes are larger than ponds.



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Swamp



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Marsh

Wetlands

Wetlands include marshes and swamps.

FIG. 6.2—Missouri has three kinds of aquatic ecosystems: streams, lakes and wetlands.

Managing aquatic ecosystems

Fisheries biologists manage bodies of water for fishing. They conduct research studies including electrofishing surveys. They also work to improve aquatic habitat, fishing quality, fish community health and biodiversity, and write management proposals and reports. Fisheries biologists analyze fish scales to determine fish age and growth, conduct water-quality analyses, and survey fishermen to determine harvest and catch rates. They manage resources to maximize a water body's potential as a sustainable fishery. The

Missouri Department of Conservation employs fisheries biologists throughout the state. These jobs usually require at least a bachelor's degree in fisheries management or a related field.



CLIFF WHITE

Missouri, less than 60,000 acres, or 2 percent, survive today. (FIG. 6.4) Statewide, 87 percent of Missouri's wetlands have been destroyed. Missouri once had 4.5 million acres of wetlands, mostly along major rivers. The **sloughs** and oxbow lakes along the Missouri and Mississippi rivers are gone. So are the wooded swamps

of southeast Missouri. But today people are starting to understand and see the value of our wetland resources. Taking care of the wetlands that are left and putting some back are some of conservation's biggest challenges today.

Healthy ecosystems are said to be balanced, but balanced does not mean unchanging. Ecosystems are always changing. They may change in response to natural or human-caused events. For example, heavy rains can force a river to change course, leaving the old channel high and dry. A human activity such as straightening a stream speeds up erosion and cuts out curves that shelter fish and other aquatic life. Changes may destroy habitat for some species and create it for others.

Whether changes are good or bad depends on how they affect the ecosystem's **biodiversity**. This term refers to the variety and number of different organisms and populations, and the way they live together. The greater the biodiversity in an ecosystem, the healthier, more sustainable and better balanced it is. Some human activities that can reduce aquatic biodiversity are draining a swamp, damming a river or pumping out water. These activities destroy habitat, which is the main cause of species decline. Therefore, protecting and restoring a wide variety of habitat helps keep species from becoming endangered or extinct.

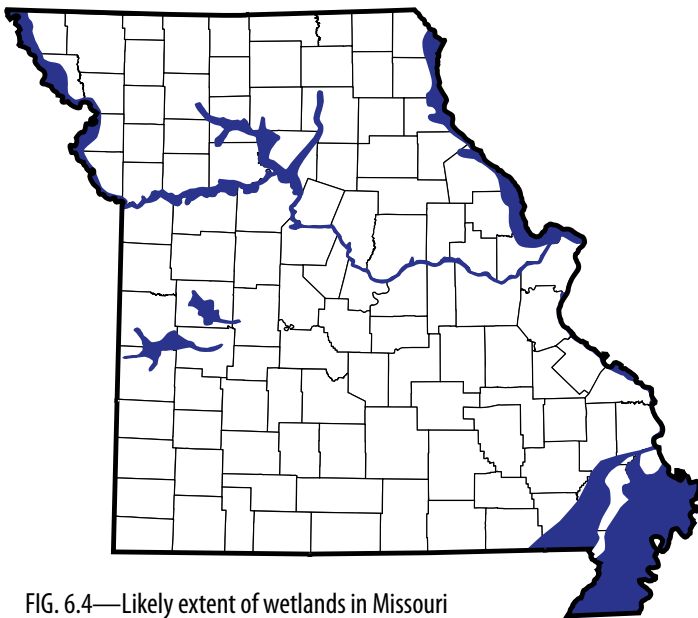


FIG. 6.4—Likely extent of wetlands in Missouri before European settlement.